

MONTHLY WEATHER REVIEW.

VOL. XII.

WASHINGTON CITY, JULY, 1884.

No. 7.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during July, 1884, based upon the reports from the regular and voluntary observers of the Signal Service and co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given and their approximate paths shown on chart i.

The number of atmospheric depressions, described under "areas of low barometer," is twelve, or three more than the average number for July during the eleven preceding years.

The month, as a whole, was remarkably cool, the temperature averaging below the mean over all the northern districts and in the Southern States east of the Mississippi river; the deficiencies were most marked from Dakota eastward to the lower lakes and in the northern plateau. Over the southwestern portion of the country, from the Mississippi to Arizona, and along the California coast the mean temperature was above the normal.

The rainfall was excessive on the Atlantic coast north of the Carolinas; in eastern Tennessee, the lower lake region, and in the Missouri and Arkansas valleys. It was below the average in the upper lake region, Ohio valley, and over all of the southern districts.

Drought prevailed in several states during the month, being most severe in Texas, where the rainfall for June also was deficient. The rains accompanying low area x. terminated the drought which prevailed in central Ohio previous to the 23d.

On the evening of the 3d a remarkably brilliant meteor was extensively observed, having been seen in Connecticut, New York, New Jersey, Pennsylvania, Virginia, and the province of Ontario, Canada.

The severest local storms of the month were associated with low areas iv.-v. and x.

In the preparation of this REVIEW the following data, received up to August 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and fifty-eight monthly journals, and one hundred and fifty-four monthly means from the former, and fifteen monthly means from the latter; two hundred and fifty-nine monthly registers from voluntary observers; fifty-seven monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime

Register;" monthly weather reports from the local weather services of Alabama, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Nebraska, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The mean atmospheric pressure for July, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii. The mean pressure for the month is greatest over the north Pacific coast region and along the coast of the Gulf of Mexico. As is usual during the summer months, an area of barometric minima occupies the middle and southern plateau regions, where the mean pressures are below 29.8. A second area of barometric minima is also shown over the Gulf of Saint Lawrence, where the pressure falls to 29.74 at Father Point, Province of Quebec. To the eastward of the one hundredth meridian the mean pressures decrease with the increase of latitude from 30.0 along the Gulf coast, to slightly below 29.9 in the extreme northwest and lake region, and to 29.75 over the Gulf of Saint Lawrence. The highest barometric means for the month occurred in the north Pacific coast region—Olympia, Washington Territory, and Roseburg, Oregon, reporting 30.04, and Fort Canby, Washington Territory, and Portland, Oregon, reporting 30.05.

Compared with the mean pressure of the preceding month an increase is shown over Oregon, Washington Territory, and northern Idaho; along the immediate Gulf coast, and in the southern portions of Arizona, New Mexico, and Texas. The increase is most marked on the north Pacific coast, where, at Portland, Oregon, it amounts to .10. In all other districts there is a decrease, the deficiencies being unusually marked from the lake region, upper Ohio valley, and middle Atlantic states to the Canadian Maritime Provinces. Over portions of the provinces of Ontario and Quebec and in New England the barometric means vary from .25 to .27 below those for July.

Compared with the normal pressure for the month of July, deficiencies are shown over the entire country. From the one-hundredth meridian westward to the Pacific coast the departures are generally less than .05, while to the eastward of the region named they increase to from .10 to .13 over a narrow area extending in a northeasterly direction from the Indian Territory and eastern Texas to New England.

BAROMETRIC RANGES.

The monthly barometric ranges are generally more than .50 over the northern districts from Idaho to Lake Huron, and in northern New England, the maximum ranges for the month occurring in the last mentioned district, where, at Eastport, Maine, the range is .71. Along the coast of California; from Arizona eastward to the Mississippi river, and in southern Florida, the ranges are less than .30, the smallest being .16 at Fort Apache, Arizona, and .19 at Brownsville, Texas, and Prescott, Arizona.

In the several districts the monthly ranges varied as follows:

New England.—From .46 at New Haven and New London, Connecticut, to .71 at Eastport, Maine.

Middle Atlantic states.—From .39 at Norfolk, Virginia, to .45 at Albany, New York, and Cape Henry and Chincoteague, Virginia.

South Atlantic states.—From .32 at Jacksonville, Florida, to .40 at Kitty Hawk, North Carolina.

Florida peninsula.—From .27 at Key West, to .31 at Cedar Keys.

East Gulf states.—From .29 at Vicksburg, Mississippi, to .35 at Pensacola, Florida.

West Gulf states.—From .25 at Indianola, Texas, to .38 at Fort Smith, Arkansas.

Rio Grande valley.—From .19 at Brownsville, Texas, to .26 at Rio Grande City, Texas.

Tennessee.—From .33 at Chattanooga, to .38 at Nashville.

Ohio valley.—From .40 at Indianapolis, Indiana, to .46 at Columbus, Ohio.

Lower lake region.—From .45 at Sandusky, Ohio, to .50 at Buffalo, New York.

Upper lake region.—From .50 at Port Huron, Michigan, to .74 at Marquette, Michigan.

Extreme northwest.—From .45 at Fort Totten, Dakota, to .58 at Fort Buford, Dakota.

Upper Mississippi valley.—From .40 at Cairo, Illinois, to .60 at La Crosse, Wisconsin.

Missouri valley.—From .50 at Omaha, Nebraska, and Leavenworth, Kansas, to .57 at Huron and Yankton, Dakota.

Northern slope.—From .32 at Cheyenne, Wyoming, to .57 at Helena, Montana.

Middle slope.—From .28 on the summit of Pike's Peak, Colorado, and .29 at Fort Elliott, Texas, to .43 at West Las Animas, Colorado.

Southern slope.—From .21 at Fort Stockton, Texas, to .37 at Fort Sill, Indian Territory.

Southern plateau.—From .16 at Fort Apache, Arizona, to .28 at El Paso, Texas.

Middle plateau.—43 at Salt Lake City, Utah.

Northern plateau.—From .45 at Spokane Falls, Washington Territory, to .56 at Boise City, Idaho.

North Pacific coast region.—From .36 at Roseburg, Oregon, to .49 at Olympia, Washington Territory.

Middle Pacific coast region.—From .29 at San Francisco, California, to .38 at Red Bluff, California.

South Pacific coast region.—From .25 at Los Angeles, California, to .33 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

The month has been marked by an absence of well-defined areas of high barometer, but a single area having passed from the northwest to the south Atlantic coast. The tri-daily reports indicated the proximity of high areas to the north and northwest of the United States on the 4th and 16th, and the barometer was above the mean on the north Pacific coast from the 1st to 4th and from the 26th to 31st, indicating the existence of extended high areas over the north Pacific. In all cases of high areas observed the atmospheric movement was slight, and no marked change in the weather conditions were observed.

I.—The morning reports of the 4th indicated the advance of this area to the southward over the extreme northeastern states on the Atlantic coast, while an extended low area covered the central valleys and the Rocky mountain regions. The pressure increased on the northeast coast during the 5th, and this condition was followed by a decrease of pressure attending the low area which is traced as number v. The easterly winds on the New England and middle Atlantic coasts during the transit of this high area to the southeastward over the Atlantic were attended by a marked fall of temperature in New England and New York, which was only temporary, as the southerly winds which attended low area v. caused a corresponding rise in temperature on the 7th. This area probably extended far to the east of the coast line, and was only observed from stations in its southwest quadrant.

II.—A slight rise in the barometer occurred in the Mississippi

valley following low area v., the pressure being near 30.10 in the northwest on the 6th, with brisk westerly winds in the lake region, and southeasterly winds from the Mississippi valley to the Rocky mountains. The general drift of the atmosphere was to the eastward during the 7th, attended by cool, fair weather, while the highest barometer readings occurred successively in Iowa, the upper lake region, and north of Lake Huron, where this area disappeared under the influence of a low area from the west, and a second low area which apparently developed off the middle Atlantic coast on the 8th.

III.—This area was at no time wholly within the limits of the stations of observation. On the morning of the 15th it was observed advancing eastward from the region north of Manitoba. It extended to the southeastward over the lake region and adjoining states during the 15th and 16th, attended by cool, fair weather and light to fresh northerly winds, while severe local storms occurred in the Missouri valley and extreme northwest. The movement of this area can be readily traced to the southeast until the midnight report of the 17th, but the barometer fell during the last day of observation, and the area disappeared before reaching the Atlantic coast.

IV.—This area has been traced from the Saskatchewan valley, where it appeared on the morning of the 19th, over the usual southeasterly course of high areas, to the south Atlantic states, where it was central on the 23d. On the morning of the 20th it was central in Iowa, on the 21st in Indiana, and on the 22d in North Carolina. It appeared as an area bounded by an isobar of 30.0, but the pressure increased slightly after the centre passed to the south of Minnesota. The barometric readings at stations near the centre of this area were slightly above 30.1 until the 23d, when its course changed to the westward and the pressure slowly declined as the centre passed over Florida and to the south of the east Gulf states during the 24th and 25th.

AREAS OF LOW BAROMETER.

The areas of low barometer observed during the month generally developed slight energy within the limits of the United States; they were not well-defined and in most cases were either retarded in their easterly movement, or preceded by extended low areas in the plateau, or Rocky mountain regions. Twelve areas were traced from the tri-daily charts, only one of which number reached the Atlantic coast south of New England; one disappeared within the limits of the United States after passing from the Rocky mountains to the Ohio valley, and seven passed eastward over the lower Saint Lawrence valley.

The following table gives the latitude and longitude in which each area was first and last observed, and the average hourly velocity:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	50 00	112 00	37 00	102 00	14.5
II.	52 00	72 00	48 00	62 00	18.5
III.	40 00	92 00	48 00	81 00	20.0
IV.	47 00	99 00	51 00	94 00	31.0
V.	45 00	91 00	51 00	68 00	30.0
VI.	40 00	113 00	35 00	85 00	20.0
VII.	35 00	70 00	52 00	64 00	21.0
VIII.	49 00	89 00	47 00	60 00	15.0
IX.	47 00	101 00	49 00	60 00	20.0
X.	43 00	110 00	46 00	58 00	34.0
XI.	38 00	88 00	36 00	74 00	23.5
XII.	47 00	82 00	49 00	71 00	21.0
Mean hourly velocity.					22.4

I.—The morning reports of the 1st placed the centre of this low area in British America north of Montana, with a well-marked high area west of Oregon, and a slight excess of pressure in Manitoba and Minnesota. The succeeding reports of the 2d and 3d showed this area moving first rapidly to the southward over the eastern slope of the Rocky mountains to

Colorado, where it became well-defined, and extended over all of the mountain districts. The movement became much retarded in the southern portion of its path, and after a slight advance to the eastward it disappeared, leaving an extended barometric trough to the northeastward, including within its limits the northwest and lake region, within which the secondary areas traced as numbers iii. and iv., developed.

II.—This was a slight disturbance which passed eastward far to the north of New England during the 2d, it being central north of Quebec at midnight of the 1st. It was at no time well-defined and was attended by no marked change in the meteorological condition of the regions under observation.

III.—When the disturbance traced as low area i., was central in southern Colorado, this area formed in the central Mississippi valley, and during the 3d and 4th it passed northeastward over the upper lake region, the centre of an extended rain area being immediately north of Lake Huron at midnight of the 4th. The succeeding reports indicated that this area joined number v., which developed in the eastern portion of the upper lake region during the night.

IV.—This secondary depression formed in northern Dakota, when low area number i. was central in northern Texas, and it apparently moved northward over Manitoba on the 4th, causing severe local storms and heavy local rains in the extreme northwest. During the night of the 4th the course changed to easterly, and by the morning of the 5th, it had united with number v., which was at that time central north of Lake Superior.

V.—As previously stated, this disturbance was first observed in the western portion of the upper lake region, attended by two secondary depressions, one to the east and north of Lake Huron, and the other over the northwest. These three depressions united on the morning of the 5th, and formed a storm of marked energy which passed eastward north of the lake region, attended by dangerous winds on Lakes Michigan, Superior, Erie and Huron, and general rains throughout the Northern states during the 5th. This storm apparently decreased in energy after passing to the northeast of the lake region. It followed the general course of the Saint Lawrence valley until the afternoon report of the 6th, when it was probably central north of Quebec.

VI.—This disturbance apparently resulted from the gradual fall of the barometer in the Rocky mountain region during the 5th and 6th, and reports from the extreme southwestern stations indicate that it may have originated in the Gulf of California or on the south Pacific coast. The general course of this area was northward over the Rocky mountains during the 5th, 6th, and 7th, when the centre of disturbance was in British America, north of Montana. At this point the course changed to the southeast, after which the disturbance followed the Missouri valley, passing over Missouri, southern Illinois, and Kentucky, and finally disappeared by a gradual loss of energy after reaching central Tennessee on the morning of the 10th. The heavy rains which occurred in the south Atlantic states on the 11th and in eastern Tennessee on the 10th probably resulted from the cool air attending the high area which followed this disturbance and caused the barometric depression to disappear, so that isobars drawn for every one-tenth inch failed to indicate the existence of this depression in the region named, but an examination of the barometric readings and wind directions exhibited by the tri-daily charts of the 10th and 11th would indicate that this disturbance either continued its southeasterly course to the coast or was immediately followed by a secondary depression, which caused the heavy rains and local storms referred to above.

VII.—This depression probably developed off the middle Atlantic coast during the night of the 8th. The reports from the coast stations indicate that a well-defined cyclonic storm of slight energy passed northward parallel to the coast. After reaching the New England coast the centre passed northward to the Saint Lawrence valley and disappeared. Strong gales occurred during the 9th at Yarmouth, Nova Scotia, and on the

coast of Maine when the centre of the disturbance was passing along the New England coast.

VIII.—This depression passed eastward north of the lake region during the 12th and 13th, the centre being north of Lake Superior at midnight of the 11th, and in the Saint Lawrence valley near Quebec at the 11 p. m. report of the 13th, when the barometer fell to 29.45. Fresh to brisk westerly winds prevailed in the lake region when the centre moved over the Saint Lawrence valley to northern New England, and dangerous westerly gales were reported off the middle Atlantic coast. This storm moved southeastward, as it approached the coast of Nova Scotia, with increasing energy during the 14th and when last observed it was apparently moving in a northeasterly direction, the centre being north of Sidney, where the barometer had fallen to 29.21, with brisk southerly winds. At this report—3 p. m. of the 15th—a northeasterly gale prevailed at Bird Rock, where the barometer read 29.28. When first observed the central area was inclosed by an isobar of 29.7, and when last observed the pressure had decreased to 29.30, this decrease having occurred gradually as the disturbance moved to the eastward.

IX.—The morning reports of the 17th exhibited a slight depression in the upper Missouri valley, attended by general rains in its northern quadrants, with relatively high areas over the lake region and on the north Pacific coast. This storm passed directly east over the latitude in which it was first observed, until the centre reached northern Nova Scotia when the course apparently changed to the north. No marked disturbance occurred within the limits of the United States during the passage of this storm over the lake region, but as the depression approached the Saint Lawrence valley its easterly movement was retarded, while strong gales occurred at the most northerly stations in the maritime provinces.

X.—This disturbance appeared north of the lake region as an extended area of low barometer on the morning of the 23d, but it probably developed in the Rocky Mountain region on the 21st, as the tri-daily charts show an ill-defined depression moving eastward over the course of the low area traced as number x. on chart i. Very heavy rains and dangerous gales occurred in the upper lake region when this storm passed over Lake Superior, the maximum velocities reported being 43 miles per hour at Milwaukee, Wisconsin, at 3 p. m. of the 3d, and 38 miles at Grand Haven, Michigan, at the morning report of the same day. This storm continued its easterly course, crossing the Saint Lawrence valley near Montreal, and passing over northern New England, and thence east of Sidney, Nova Scotia, disappearing on the 24th, although the barometer remained low in that region until the 26th.

XI.—On the morning of the 28th the barometer was generally below the mean for the month in the lake region and the central valleys, with an indication that a low area would develop in the lower Ohio valley. General rains prevailed south of the lake region during the 28th, and this depression passed directly east to the middle Atlantic coast, where it was central at the afternoon report of the 29th. The rain area extended over New England and southward to Florida, the greatest rainfall occurring near the storm centre. Dangerous easterly winds were reported off the New England and middle Atlantic coasts, and southwesterly winds, ranging in velocity from thirty to forty miles per hour, occurred on the North Carolina coast on the 29th. This storm probably followed the general course of the Gulf stream after leaving the middle Atlantic coast.

XII.—This was a slight depression which was located north of Lake Huron at midnight of the 30th. It apparently passed southward to Lake Ontario, and during the 31st moved northeastward over the Saint Lawrence valley as a storm of considerable energy. The centre was near Quebec at the close of the month, the barometer having fallen to 29.46 at that station, with strong southerly winds in the lower Saint Lawrence valley, and a marked barometric gradient to the southeast and southwest of the centre of the disturbance.

NORTH ATLANTIC STORMS DURING JULY, 1884.

(Pressure expressed in inches and in millimetres; wind-force by scale of 0-10.)

The paths of the atmospheric depressions that have appeared in the north Atlantic ocean during the month have been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to August 20, 1884.

The observations used are in general simultaneous, being taken each day at 7h. a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Five depressions, none of which exhibited any marked storm-energy, are charted for the month of July, 1884. The depressions numbered 3 and 4 were apparently continuations of disturbances which passed over the United States and Canada; after moving northeastward to about N. 55°, W. 45°, they passed beyond the region covered by the reports. Number 5 probably developed near the coast of the United States on the 27th, and moved northeastward during the closing days of the month. Numbers 1 and 2 were first observed near the twentieth meridian; they moved northeastward along the British coasts. The weather over the north Atlantic during the month may be summarized as follows: 1st to 4th, strong winds to moderate gales from sw. to nw.; squally weather and high sea; 4th to 6th, generally light winds, very dense fogs west of W. 45°; 6th to 20th, moderate to strong w. breezes, generally disagreeable weather and dense fogs; 20th to the close of the month, strong w. breezes to moderate gales, heavy seas and squally weather, with dense fogs.

The following are descriptions of the depressions charted:

1.—This disturbance appeared north of the fiftieth parallel and between W. 15° and 25° on the 8th. On that date the s. s. "Wisconsin," C. L. Rigby, commanding, reported, in N. 50° 51', W. 22° 00', barometer 29.31 (744.5), wind wnw., force 7, rainy, squally weather. Vessels between N. 45° and 50° and to the westward of the twenty-fifth meridian had moderate w. and nw. gales, while those to the eastward of the "Wisconsin" had moderate s. gales with squally, rainy weather. The storm-centre moved slowly northeastward, and on the 9th the lowest barometric reading was observed on board the s. s. "Llandaff City," T. L. Weiss, commanding, in N. 51° 36', W. 20° 36', when the barometer read 29.1 (739.1), wind wnw., force 6, weather clear. Moderate nw. gales prevailed over the region from W. 20° to 35° and from N. 45° to 50°. During the 9th the disturbance moved towards the Irish coast.

2.—This disturbance apparently developed prior to the 11th in the region between N. 40° and 45° and W. 20° and 25°. By the morning of the 11th the barometer on board the bark "Sunbeam," Joseph Hand, commanding, in N. 40° 57', W. 25° 36', had fallen from 30.02 (762.5) to 29.55 (750.6) and the wind shifted from w. to wnw., and increased to force 8, weather cloudy; heavy rain fell for six hours during the interval between the observations of the 10th and 11th. To the northeastward of the "Sunbeam," the s. s. "Jason," D. H. Hinlopen, commanding, reported barometer 29.35 (745.5), wind sse., force 3, fair (ship's position, N. 49° 19', W. 20° 8'); vessels to the westward and northwestward had moderate n. and ne. gales with very high seas. By the morning of the 12th the region of least pressure was transferred to about N. 51°, W. 19°; on that date the s. s. "Eider," W. Willigerod, commanding, reported in N. 50° 21', W. 18° 40', barometer 29.18 (741.2), wind s., force 4, squally. The s. s. "British Princess," E. H. Freeth, commanding, in N. 49° 26', W. 23° 10', had barometer 29.26 (743.2), wind nne., force 6, clear. Other vessels to the westward of W. 25° reported strong n. and nw. breezes to moderate gales. On the 13th the centre of disturbance was near N. 53°, W. 18°, where the pressure was 29.22 (742.2); during the day it moved north-northeastward, and on the 14th it appeared off the northwestern coast of Ireland, the pressure at the centre remaining below 29.3 (744.2).

3.—This was probably a continuation of the disturbance described under "areas of low barometer," as number viii. During the 15th the disturbance passed to the eastward of Nova Scotia, and on the morning of the 16th, the centre was near the southern coast of Newfoundland. The disturbance moved slowly eastward and on the 17th the pressure was least in the vicinity of the fiftieth meridian and between N. 45° and 50°; during the day it moved northeastward and disappeared north of the fiftieth parallel, the lowest observed barometer reading being 29.59 (751.6.).

4.—This was a continuation of the disturbance traced over the United States and Canada as low area x. At midnight of the 24th the depression was central between Cape Breton Island and Newfoundland and by the morning of the 25th it was in Newfoundland. It moved northeastward during the day, and on the 26th the centre was apparently near N. 53°, W. 45°, whence it passed beyond the field of observation.

5.—This disturbance apparently developed near the coast of the United States between N. 35° and 40° on the 27th, as shown by the following reports: brig "Lilian," H. F. Schire, commanding, in N. 36° 58', W. 73° 5', barometer 29.93 (760.2), wind sw., force 3, squally; during the 27th the wind blew in squalls of great force from sw. to w., with rain, thunder and lightning, and occasional calms; this weather continued throughout the twenty-four hours. Captain Randall, commanding the ship "Dynomene," in N. 37° 0', W. 73° 6', reported barometer 29.89, (759.2), wind wsw., force 3; 4 p. m., barometer 29.78 (756.4), heavy squalls of wind, rain, and thunder and lightning. The bark "Levanter," A. F. Vesper, commanding; in N. 38° 0', W. 74° 40', reported barometer 29.83 (757.7), a fall of .13 inch, wind sse., force 2, cloudy.

On the 28th, the disturbance was near N. 40°, W. 65°; the schooner "Arthur Burton," W. E. Crockett, commanding, reported: in N. 42°, W. 70° 15', barometer 29.75 (755.6), wind nne., force 4, threatening; bark "Diamant," L. Haesloop, commanding, in N. 40° 30', W. 67° 51', barometer 29.79 (756.6), wind wsw., force 5, overcast; s. s. "Gallia," M. Murphy, commanding, in N. 40° 33', W. 68° 7', reported barometer 29.52 (749.8), wind n., force 2, fair. The disturbance moved east-northeastward during the day, and was encountered by the s. s. "Greece," when between N. 41° 10', W. 56° 9', and N. 40° 59', W. 61° 23'. Captain W. Tyson, commanding that vessel, reported as follows: 28th, 11 hrs. 56m., moderate sw. gale, heavy rain, and sea from sw., barometer 29.75 (755.6); 16 hrs., wind hauling to westerly, with rain-squalls and rising nw. sea, barometer 29.7 (754.4); 20 hrs. 3 m., wind nnw., heavy cross sea, weather breaking, barometer 29.8 (756.9).

On the 29th, the region of low pressure was near N. 42°, W. 52°, where the lowest barometer reading was 29.62 (752.3), wind ese. force 3, raining; on the sixtieth meridian the wind was n. and nw. blowing with the force of a moderate gale. On the 30th the disturbance was central near N. 45° W. 35° attended by light easterly winds between N. 45° and 50° and barometer ranging from 29.7 (754.4) to 29.9 (759.4). By the 31st it had reached N. 50°, W. 20°; the winds between W. 40° and 30°, had now changed to n. and w. but they did not exceed the force of a strong breeze. The s. s. "Rhyndland," J. C. Jamison, commanding, in N. 47° 40', W. 29° 59' reported barometer 29.85 (758.2), wind se. to n. and nnw., moderate gale, high sea.

OCEAN ICE.

Chart i. also exhibits the southern and eastern limits of the region within which icebergs were observed in the north Atlantic ocean during the period from July 8th to August 8th, 1884. These limits are determined from reports sent by shipmasters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and from other data published in the "New York Maritime Register."

For the above-mentioned period the southern limit of the ice-region was somewhat to the northward of 46° north latitude, the southernmost iceberg having been seen in N. 46° 24'. The eastern limit was near W. 46°.

Compared with the chart for the preceding month (June), a very marked difference is shown in the position of the southern limit of the ice-region. From July 8th to the close of the month no icebergs had been reported south of the forty-sixth parallel, while in the preceding month they were reported as far south as N. 40° 40', thus showing a difference of more than five degrees of latitude. As regards the eastern limit, it is only about 30' west of that for June.

A comparison with the chart for the corresponding month in 1883 shows that the southern limit in July of that year was about 4° farther south, and the eastern limit about 1° to the eastward of those for the present month.

A comparison with the chart for the same month in 1882 shows the limits of the ice region in that year to have been about 6° to the southward and about the same distance to the eastward of the limits as determined for July, 1884.

The following reports have been received up to August 20th:
July 6th.—Bark "Fluorine" met pack ice in N. 57° 38', W. 45° 21'.

8th.—Capt. G. S. Dale, commanding the s. s. "Brooklyn," reported: "Straits of Belle Isle full of large icebergs; numerous icebergs in the vicinity of Belle Isle. The last berg was seen in N. 52° 41', W. 51° 5'."

9th.—Captain Wilson, of the bark "Fluorine," reported: "working the ship through heavy ice in N. 60° 3', W. 48° 14'."

15.—S. S. "Eider," in N. 47° 6', W. 48° 0', passed an iceberg about eighty-seven feet high; also, in N. 46° 24', W. 50° 2', passed a small berg about five miles to the northward.

18th.—S. S. "State of Nebraska," in N. 47° 25', W. 47° 10', passed two icebergs, one of them being very large.

21st.—S. S. "Edam," in N. 46° 30', W. 46° 45', passed an iceberg.

23d.—Captain Wilson of the bark "Fluorine," reported in N. 60° 42', W. 50° 2' "working out through heavy ice."

24th.—Ship "America," in N. 46° 30', W. 46° 30', passed a small iceberg. Captain Benson, commanding the s. s. "Lake Huron," reported: "Passed numerous large and small icebergs from one hundred and forty miles east of Belle Isle to the eastern entrance to the Straits, then encountered numerous bergs of great magnitude, almost blocking the entrance of the Straits; also passed many icebergs about twenty miles west of Greenland Island."

25th.—Captain W. P. Couch, commanding the s. s. "Ontario," reported: "Many icebergs in the Straits of Belle Isle; saw a large berg in N. 52° 40' W. 52° 25', and many bergs thence to N. 50° 0', W. 59° 30'."

27th.—S. S. "March," in N. 47° 24' W. 46° 35', passed five large icebergs.

28th.—S. S. "Ludgate Hill," in N. 48° 36', W. 46° 28', passed an iceberg.

29th.—S. S. "Ludgate Hill," in N. 47° 14', W. 50° 37', passed an iceberg, also in N. 46° 58', W. 50° 42', passed another, and several between that and Cape Race.

30th.—S. S. "Lord Gough," in N. 48° 3', W. 47° 16', passed two small icebergs.

31st.—S. S. "City of Rome," in N. 47° 50', W. 49° 35', passed an iceberg. Captain Dale, of the s. s. "Brooklyn," reported: "Saw the first ice about four miles east of Belle Isle, one very large berg about two miles east of it. The Straits were full of icebergs and detached pieces."

August 2d.—S. S. "Critic," at New York, reported having passed several icebergs on the coast of Newfoundland.

4th.—S. S. "Celtic," in N. 47° 20', W. 47° 3', passed an iceberg.

8th.—S. S. "Circassia," in N. 47° 10', W. 46° 59', passed a large iceberg.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for July, 1884, is exhibited on chart ii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for July; the mean temperatures for July, 1884, and the departures from the normal for each of the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for July, 1884.

Districts.	Average for July, Signal-Service observations.		Comparison of July, 1884, with the average for several years.
	For several years.	For 1884.	
New England.....	69.3	66.3	3.0 below.
Middle Atlantic states.....	75.5	72.9	2.6 below.
South Atlantic states.....	80.6	79.7	0.9 below.
Florida peninsula.....	83.2	83.5	0.3 above.
Eastern Gulf states.....	81.2	80.6	0.6 below.
Western Gulf states.....	82.5	83.7	1.2 above.
Rio Grande valley.....	85.3	85.6	0.3 above.
Tennessee.....	79.3	77.9	1.4 below.
Ohio valley.....	77.5	75.0	2.5 below.
Lower lake region.....	71.0	66.8	4.2 below.
Upper lake region.....	67.7	63.6	4.1 below.
Extreme northwest.....	67.8	63.1	4.7 below.
Upper Mississippi valley.....	75.8	73.0	2.8 below.
Missouri valley.....	74.3	71.8	2.5 below.
Northern slope.....	68.0	65.9	2.1 below.
Middle slope.....	74.7	75.9	1.2 above.
Southern slope.....	80.0	83.7	3.7 above.
Southern plateau.....	81.8	82.8	1.0 above.
Northern plateau.....	70.8	67.4	3.4 below.
North Pacific coast region.....	64.8	62.7	2.1 below.
Middle Pacific coast region.....	71.4	69.9	1.5 below.
South Pacific coast region.....	75.9	76.9	0.5 above.
Mount Washington, N. H.....	47.9	44.6	3.3 below.
Pike's Peak, Colo.....	49.3	39.8	9.5 below.
Salt Lake City, Utah.....	70.3	73.4	2.9 below.

A comparison of the mean temperatures for July, 1884, with the average for the corresponding months, shows the former to have been unusually cool over the greater part of the United States. In southern Florida; along the immediate California coast, south of San Francisco; in southeastern Arizona; and from New Mexico eastward to the lower Mississippi valley, except along the Texas coast from Indianola to the mouth of the Rio Grande river (where there was a slight deficiency), the reports for July, 1884, show that the mean temperature was higher than the average. In the districts above mentioned the departures above the normal were greatest from western Texas to southeastern Arizona, where they were from 4° to 5°. Throughout the northern sections of the country the mean temperatures were everywhere below the average, the departures being most marked from northeastern California to western Montana, and from Dakota eastward to southern New England and the northern portion of the middle Atlantic states, where they ranged from 4° to 6°. Along the immediate coast, from southern New Jersey to Northern Florida, and in Georgia and Alabama, the departures were less than 2°.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.		Stations reporting lowest.	
Fort McDowell, Arizona.....	90.8	Pike's Peak, Colorado.....	39.8
Yuma, Arizona.....	90.6	Mount Washington, New Hampshire.....	44.6
Rio Grande City, Texas.....	88.4	Port Angeles, Washington Territory.....	55.8
Phoenix, Arizona.....	87.7	Eastport, Maine.....	58.6
Shreveport, Louisiana.....	86.2	Fort Canby, Washington Territory.....	58.6
El Paso, Texas.....	85.5	Fort Maginnis, Montana.....	58.6
Fort Concho, Texas.....	85.3	Marquette, Michigan.....	59.9
New Orleans, Louisiana.....	85.3	San Francisco, California.....	60.0
Galveston, Texas.....	85.2	Saint Vincent, Minnesota.....	60.8
Fort Stockton, Texas.....	85.1	Olympia, Washington Territory.....	61.2
Fort Sill, Indian Territory.....	85.1	Mackinaw City, Michigan.....	61.3
Key West, Florida.....	85.0	Fort Shaw, Montana.....	61.6
Indianola, Texas.....	83.5	Deadwood, Dakota.....	62.2

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures for July, 1884. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: mean temperature, 81° 6, is 4° 2 above the July average of the last two years.